CHAPTER FOUR

Ecosystems and Biodiversity

Species and ecosystems provide a vast array of valuable services. For example, about one third of U.S. agricultural output is from insect-pollinated plants. Nature provides many other services, such as producing raw materials, purifying water, storing waste, and regulating climate.

Despite the huge value of species and ecosystem services, many such services are threatened by human activities. Pollinators such as wild honeybees, for example, are declining as a result of habitat fragmentation, loss of nesting sites, exposure to pesticides, and many other factors.

Ecosystems are defined as the collection of species and processes that comprise such recognizable units as tallgrass prairies, coastal salt marshes, redwood forests, or high desert. Ecosystems are usually described as geographically defined ecological units, consisting of groupings of plants and animals and their surrounding environment.

Ecosystems can be classified in a number of different ways. In *Our Living Resources*, a 1995 Interior Department report, ecosystems are organized in four broad categories: terrestrial, aquatic/freshwater, coastal/marine, and riparian. Within these four broad categories are many smaller ecological units.

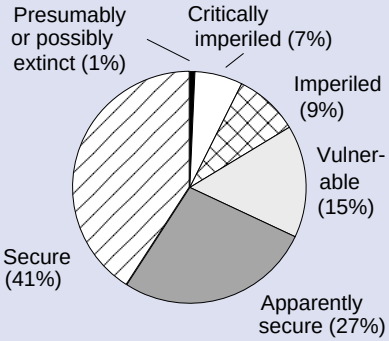
Vegetation structure and plant species composition are being used by The Nature Conservancy and the state and federal agencies participating in the Network of Natural Heritage Programs (in collaboration with the Federal Geographic Data Committee) to develop a framework for the classification of terrestrial ecological communities in the United States. Approximately 4,000 ecological communities have been identified using this framework.

Biodiversity

As defined by the Convention on Biological Diversity, biodiversity is "the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems."

The Nature Conservancy and Natural Heritage Network maintain databases with information on more than 28,000 U.S. species and an additional 11,000 subspecies and varieties. In 1997, The Nature Conservancy reported on the conservation status of 20,439 native US species, representing 13 major groups of plants and animals that have been classified and studied

Figure 4.1 Status of U.S. Plant and Animal Species, 1997



Source: The Nature Conservancy, *Priorities for Conservation: 1997 Annual Report Card for U.S. Plant and Animal Species* (TNC, Arlington, VA, 1997).
Note: Total = 20,439 species; chart does not include 296 species not yet ranked.

in sufficient detail to allow a status assessment for each of their species. The analysis revealed that, based on their global rarity, about one third of the species surveyed were in some danger of extinction. About 1.2 percent were presumed to be extinct, 6.5 percent were classified as critically imperiled, another 8.8 percent were imperiled, and 15.4 percent were classified as vulnerable (Figure 4.1). The greater number of imperiled species are in the Southeast, Southwest, Hawaii, and California.

Those animals that depend on freshwater habitats—mussels, crayfish, fishes, and amphibians—are in the worst condition overall. In many national waterways, mussel populations have suffered badly from habitat loss as a result of dam construction, channelization, dredging operations, and water pollution. Dam construction alone has wiped out 30 to 60 percent of native mussel populations in some rivers. Competition from nonnative mollusks, notably the Asian clam and the zebra mussel, also have contributed to the decline. It is estimated that about two thirds of all native mussel species are in danger.

Freshwater fishes also are experiencing relatively rapid changes in their habitats, often causing risks to their survival. Of the roughly 800 native freshwater species in the United States, The Nature Conservancy estimates that about 35 percent are imperiled or vulnerable. (See *Environmental Quality 1994-95*, pp. 149-165.)

The number of threatened and endangered species has risen steadily since 1980 (Figure 4.2). By the end of 1997, there were a total of 896 U.S. species on the endangered list, including 553 plant species, and another 230 U.S. species (115 plants) on the threatened list. (Part III, Table 4.6)

The news is not all bad, however. Among raptors, populations of ospreys, bald eagles, and peregrine falcons have increased in number as they recover from the past effects of pesticides. The bald eagle population increased from a low of 400 nesting pairs in 1963 to just over 4,700 nesting pairs in 1995 within the contiguous United States (there are an estimated 20,000-25,000 pairs within Alaska). The 1972 ban on DDT was a significant factor in this recovery.

TRENDS

At the species level, roughly 1.75 million of the world's estimated 13 to 14 million species have been described. The best known groups are terrestrial vertebrates

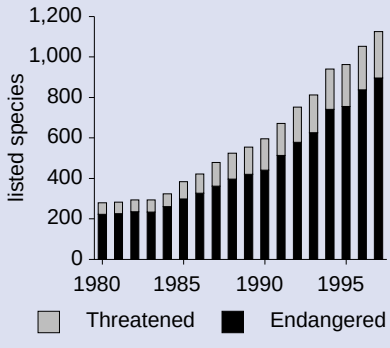
and higher plants. Even among those, there is sufficient information about population trends for only a few groups, including trees (from the Forest Service's long-term monitoring plots), birds (from annual censuses), commercially exploited species (e.g., certain marine fish species), and certain terrestrial and marine endangered species.

Ecosystems

At the ecosystem level, work is now underway to develop a systematic methodology for identifying ecosystems and determining trends in terrestrial ecosystems. Rough estimates have been made for certain relatively accessible ecosystems such as forests and wetlands.

Ecosystems and biodiversity are threatened by a variety of factors, including conversion of natural lands for other uses, pollution, exploitation, and invasions of non-indigenous species.

Figure 4.2 Threatened and Endangered U.S. Plant and Animal Species, 1980-1997



Source: See Part III, Table 4.6.

In 1995, Defenders of Wildlife listed the 21 "most-endangered" ecosystems in the United States. The three highest ranking ecosystems were the South Florida landscape, Southern Appalachian spruce-fir forest, and longleaf pine forest and savanna. The ranking was based on four criteria: decline in original area since European settlement, present area (rarity), imminence of threat, and number of federally listed threatened and endangered species. In addition, states were ranked with an "overall risk index" according to how many endangered ecosystems they contain, how many imperiled species they harbor, and how much development they face (Figure 4.3).

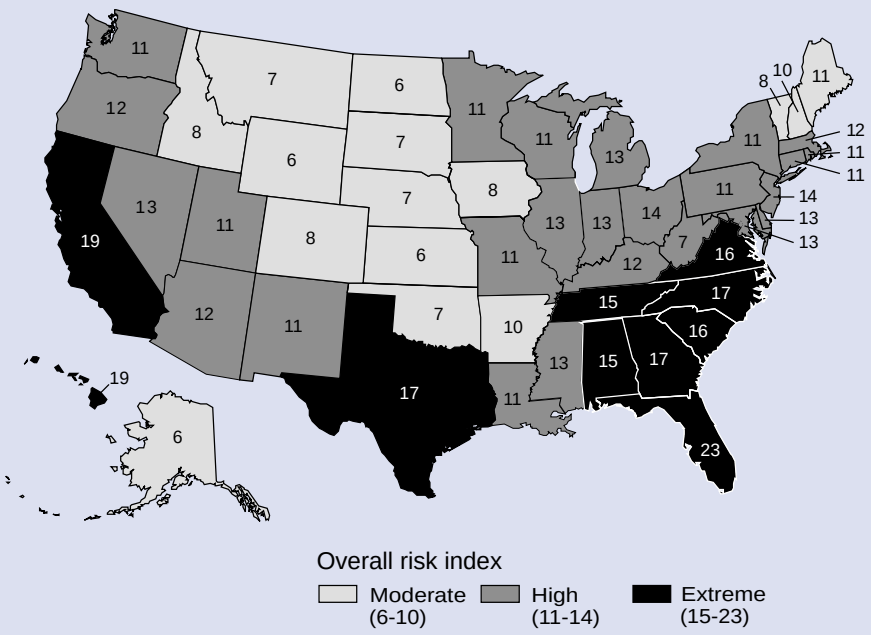
Aquatic ecosystems have been severely degraded in the last century in the United States. Natural aquatic systems have been altered for transportation, diverted for agricultural and municipal needs, and straightened, dammed, and polluted.

There is relatively little information about trends in marine ecosystems. Perhaps the best known systems are coral reefs. Coral reefs are the world's most biologically diverse marine ecosystems, home to one third of all marine fish species and tens of thousands of other species. It is estimated that 10 percent of the world's coral reefs have already been degraded beyond recovery, and another 30 percent are likely to decline in the next 20 years.

Terrestrial Species

Many U.S. resident and neotropical migrant bird species are declining in numbers, some drastically so. Forty-eight percent of the 421 bird species monitored

Figure 4.3 Overall Risk to Ecosystems



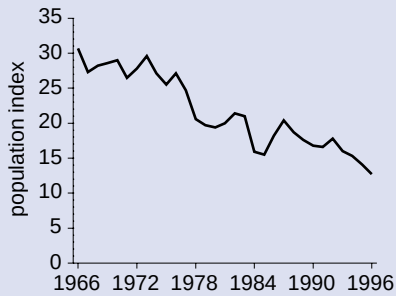
Source: R.E. Noss and R.L. Peters, *Endangered Ecosystems: A Status Report on America's Vanishing Habitat and Wildlife* (Defenders of Wildlife, Washington, DC, 1995).

Notes: The overall risk to ecosystems is calculated by combining three factors: overall development pressure, the percentage of species in the state that are imperiled, and the number of most endangered ecosystems. Values range from 6 to 23, with 23 signifying the most extreme risk.

by the U.S. Fish and Wildlife Breeding Bird Survey have decreased in numbers over the past 31 years. Some species, such as northern bobwhite (Figure 4.4) and loggerhead shrike (Figure 4.5) are so consistently declining that few question the trend.

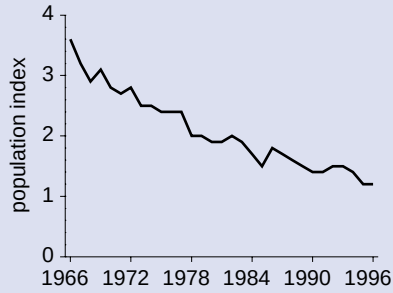
In general, though, species populations tend to be cyclical, decreasing in some time periods (or locations) and increasing in other periods (or locations) (Part III, Table 4.1). For example, populations of permanent resident and short-distance migrant (birds wintering primarily in the U.S. and Canada) species are adversely affected by periodic episodes of unusually harsh winter weather. Examples include the Carolina wren (Figure 4.6)

Figure 4.4 Northern Bobwhite Population Trends, 1966-1996



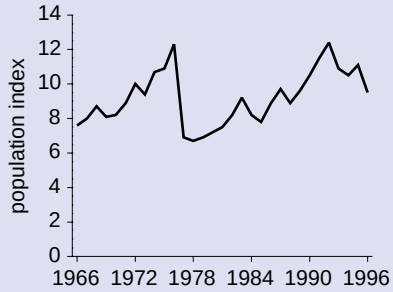
Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

Figure 4.5 Loggerhead Shrike Population Trends, 1966-1996



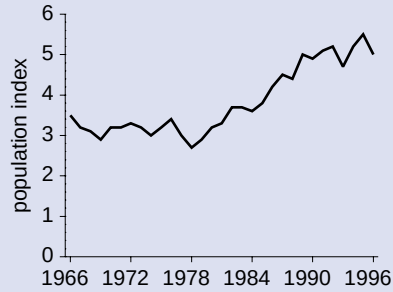
Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

Figure 4.6 Carolina Wren Population Trends, 1966-1996



Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

Figure 4.7 Eastern Bluebird Population Trends, 1966-1996



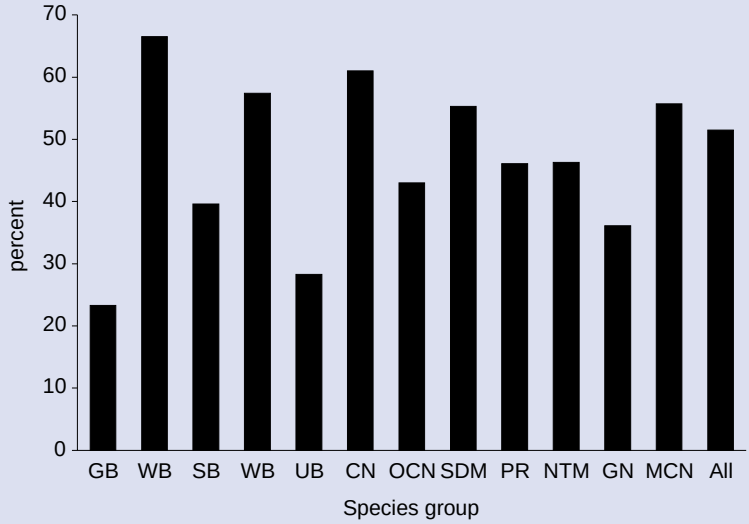
Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

and eastern bluebird (Figure 4.7) whose populations dramatically declined during the harsh winters of 1976-77 and 1977-78 but rapidly recovered during the 1980s.

Analyses of population trends based on groups of species that share similar attributes, such as breeding habitat, nest type, migration status, and nest location, provide "big picture" summaries that are useful in identifying major patterns of population change. For example, only about one fourth of all grassland-breeding bird species have shown positive population trends during the 1966-96 period (Figure 4.8). But this approach can hide detail within groups, such as the steep decline in forest-dwelling neotropical migrants. Declines are quite severe for some individual species, such as the wood thrush (Figure 4.9) and the cerulean warbler (Figure 4.10), which are declining at rates of 1 to 3 percent per year over the period, and for certain regions, especially the Adirondacks and the Great Smoky Mountains, where many or even most forest songbirds are declining over this period. Possible causes include changes in land use that reduce or alter summer breeding habitat and loss of winter habitat.

Populations of some North American duck species during the period from 1955 to 1997 are shown in Part III, Table 4.2. The 1997 estimated breeding population of 10 duck species surveyed by the U.S. Fish and Wildlife Service was 42.1 million birds, a figure 31 percent higher than the long-term average (Figure 4.11). This increase is consistent with habitat conditions favorable for production in 1996 and good-to-excellent habitat conditions throughout most of 1997. Although

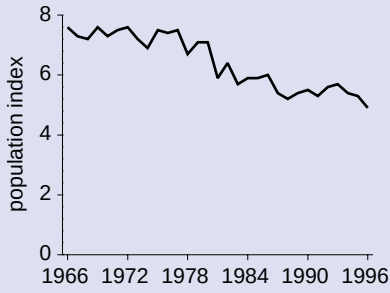
Figure 4.8 Proportion of U.S. Bird Species with Positive Population Trend Estimates by Species Group, 1966-1996



Source: U.S. Department of the Interior, National Biological Service, Breeding Bird Survey database.
Notes: GB = Grassland Breeding. WB = Wetland Breeding. SB = Successional or Scrub Breeding. WB = Woodland Breeding. UB = Urban Breeding. CN = Cavity Nesting. OCN = Open-Cup Nesting. SDM = Short Distance Migrant. PR = Permanent Resident. NTM = Neotropical Migrant. GN = Ground or Low Nesting. MCN = Mid-story or Canopy Nesting. All = 421 species. Each bar denotes the percentage of species in the group that have shown positive population trends over the period from 1966 to 1996.

two species (scaup and northern pintail) were below their long-term average, most species appear to have responded to favorable weather and habitat conditions with record numbers of broods. Approximately 66 percent of the ducks were found in the prairie-pothole region of the United States and Canada, a percentage slightly higher than the 1970s (60 percent) when conditions in this ecologically important region were considered good.

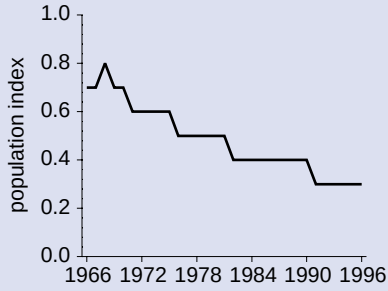
Figure 4.9 Wood Thrush Population Trends, 1966-1996



Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

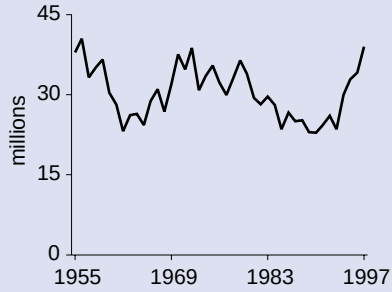
The status of the American black duck is less optimistic. Mid-winter surveys conducted in states of the Atlantic and Mississippi flyways suggest that in 1997 black ducks were 20 percent below the most recent 10-year average. The count in the Mississippi Flyway was the lowest recorded since 1955. Many factors may play a

Figure 4.10 Cerulean Warbler Population Trends, 1966-1996



Source: U.S. Fish and Wildlife Service, Breeding Bird Survey, Interactive Graphing Program on the Internet.

Figure 4.11 Breeding Population Estimates for North American Ducks, 1955-1997



Source: See Part III, Table 4.2.

role in the decline, including blood parasites, lead poisoning, red tide, oil spills, habitat losses, shooting, pesticide residues, predators, weather conditions, heavy metals, and hybridization with mallards.

Most goose and swan populations in North America remain numerically sound (Part III, Table 4.3). Favorable weather and habitat conditions for most nesting geese in 1997 led to better-than-average production (an exception was Emperor geese, where spring flooding interrupted nesting). Tundra swan populations continue to increase despite reduced production in 1997 due to less favorable weather conditions during the nesting period.

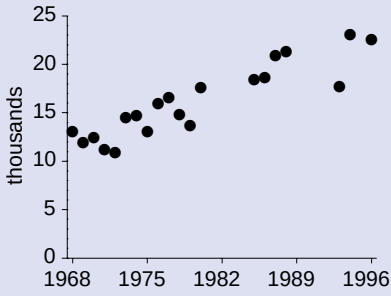
Freshwater and Marine Species

Knowledge about marine species and ecosystems lags far behind that of terrestrial systems. Best known are commercially exploited fish species, protected marine mammals, turtles and fishes (protected under the Endangered Species Act or Marine Mammal Protection Act), and certain commercially significant and accessible coastal ecosystems such as wetlands and coral reefs.

Compared to birds, less is known about the status of marine mammal stocks in U.S. waters. For example, trends are not known for 66 percent of 163 managed individual stocks in the Western North Atlantic, Gulf of Mexico, Hawaii, and Eastern Tropical Pacific. For the stocks where there was sufficient information to determine a trend, eight stocks were decreasing, 24 were stable, and 23 were increasing. A few noteworthy examples are given below.

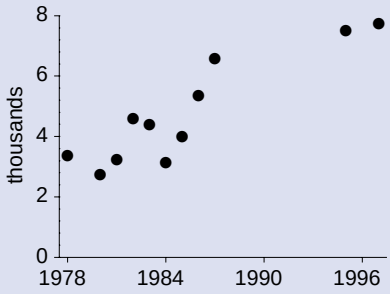
- Gray Whale. The gray whale, under the protection of the Marine Mammal Protection Act, has now recovered and has been removed from the list of endangered species. The stock has increased at a rate of 2.5-3.2 percent per year (Figure 4.12) in spite of direct competition with humans for coastal habitat, and a subsistence catch

Figure 4.12 Gray Whale Population Trends, 1968-1996



Sources: U.S. Department of Commerce, National Marine Fisheries Service, *Our Living Oceans* (NMFS, Washington, DC, 1996).
Hill, P. & D. DeMaster, *Alaska Marine Mammal Stock Assessements1998* (NMFS, Seattle, WA, 1998).

Figure 4.13 Bowhead Whale Population Trends, 1978-1997



Sources: U.S. Department of Commerce, National Marine Fisheries Service, *Our Living Oceans* (NMFS, Washington, DC, 1996).
Hill, P. & D. DeMaster, *Alaska Marine Mammal Stock Assessements1998* (NMFS, Seattle, WA, 1998).

of 167 whales per year (5,006 total) by the Soviet Union during the past 30 years.

• Bowhead Whale. All stocks of bowhead whales were severely depleted during intense commercial whaling prior to the 20th Century, declining from an estimated 10,400-23,000 in the Western Arctic stock to less than 3,000 at the end of commercial whaling. Since 1978, the Western Arctic stock of bowhead whales has increased at a rate of 3.1 percent per year (Figure 4.13). Native subsistence harvest in Alaska authorized by the International Whaling Commission removes approximately 0.1-0.5 percent of the population per year.

• Northern Right Whale. The northern right whale is the large whale species most in danger of becoming extinct in the near future, despite being protected from hunting for over fifty years. It is estimated that there are approximately 300 northern right whales remaining in the Northwest Atlantic Ocean. Even in the best of circumstances, it may take a hundred years for the right whale population to recover. Humans still present a problem for the slow moving right whale, as one of the major causes of death for this species is collisions with ships.

• Steller Sea Lion. An unprecedented and continuing decline in the Western U.S. stock of Steller sea lion has caused a recent change in listing from threatened to endangered. Although many theories have been suggested (overfishing, environmental change, El Niño, disease, etc.), it is not clear what is causing the decline. In contrast, the Eastern U.S. stock has been relatively stable since the 1980s (Table 4.1).

• Florida Manatee. Scientists are cautiously optimistic about recent increases in the Florida manatee population, a subspecies of the West Indian manatee. Although the number of manatee deaths has exceeded 10 per-

cent of the estimated total population each year since 1974, the Florida population was estimated to be more than 2,600 animals in 1996. Human-related incidents cause most manatee deaths, although cold weather and red tide outbreaks have also taken a severe toll on the Florida manatees (Table 4.2).

The populations of sea turtles in the Pacific and Atlantic are in perilous condition, despite increases in some population estimates. As shown in Part III, Table 4.5, populations of the loggerhead, green, Kemp's ridley, leatherback, olive ridley, and hawksbill are all listed as either endangered or threatened. While trends are particularly difficult to assess, a decline in many nesting sea turtle populations is accepted by most researchers, with the most serious threats being coastal development, commercial fisheries interactions, pollution, and harvest of eggs, juveniles, and adults. In the case of the Kemp's Ridley turtle, it is estimated that there were once more than 40,000 females nesting annually. Though now numbering only about 1,000 nesting

Table 4.1 Counts of Adult and Juvenile Steller Sea Lions Observed at Alaskan Rookery and Haulout Trend Sites by Year and Geographical Area from the Late 1970s and Early 1980s Through 1996

	Western U.S. Stock					
Area	late 1970s[1]	1990	1991	1992	1994	1996
			number			
Gulf of Alaska	65,296	16,409	14,603	13,179	11,871	9,782
Bering Sea/Aleutians	44,584	14,116	14,141	14,107	12,248	12,434
Total	109,880	30,525	28,744	27,286	24,119	22,216
	Eastern U.S. Stock					
Area	early 1980s	1990	1991	1992	1994	1996
			number			
California/ Oregon[2]	3,286	3,128	3,358	3,631	3,221	3,294
British Columbia	4,711	6,109[3]	nd	7,376	8,091	nd
Southeast Alaska	6,898	7,629	7,715	7,558	8,826	8,181
Total	14,895	--	--	18,565	20,176	--

Source: Hill, P.S. and D.P. DeMaster. *Alaska Marine Mammal Stock Assessment 1998* (NOAA, NMFS, National Marine Mammal Laboratory, Alaska Fisheries Science Center, Seattle, WA, 1998), and primary sources cited therein.

Notes: nd = no data. [1]Counts from 1976-1979 were combined to produce complete regional counts which are comparable to the 1990-1996 data. [2]Trend site counts in California include only Ano Nuevo Island and St. Georges Reef. Trend counts in Oregon include only Rouge and Orford Reefs. British Columbia data include counts from all sites. [3]Count was conducted in 1987.

Table 4.2 Manatee Causes of Death, 1974-1997

Year	All watercraft	Flood gate/ canal lock	Other human related	Perinatal	Other natural	Unde-termined	Total
				number			
1974	3	0	2	0	0	2	7
1975	6	1	1	7	1	13	29
1976	10	4	0	14	2	32	62
1977	13	6	5	9	1	80	114
1978	21	9	1	10	3	40	84
1979	24	8	9	9	4	23	77
1980	16	8	2	13	5	19	63
1981	24	2	4	13	9	64	116
1982	20	3	1	14	41	35	114
1983	15	7	5	18	6	30	81
1984	34	3	1	25	24	41	128
1985	33	3	3	23	19	38	119
1986	33	3	1	27	13	45	122
1987	39	5	2	30	16	22	114
1988	43	7	4	30	24	25	133
1989	50	3	5	38	32	40	168
1990	47	3	4	44	67	41	206
1991	53	9	6	53	14	39	174
1992	38	5	6	48	20	46	163
1993	35	5	6	39	24	36	145
1994	49	16	5	46	37	40	193
1995	42	8	5	56	35	55	201
1996	60	10	0	61	118	166	415
1997	54	8	8	61	46	65	242

Source: Florida Department of Environmental Protection, Florida Marine Research Institute, Internet Accessible Database, updated November 23, 1998.

females, the critically endangered Kemp's Ridley nesting population has shown steady increases in the number of nests from approximately 700 in the mid-1980s to over 3,000 in 1997 (Figure 4.14). Also of critical concern are populations of Pacific leatherbacks—nesting populations in Pacific Central America are severely depleted and the extinction crisis for these populations cannot be overstated. (Part III, Table 4.5)

The current lists of endangered species suggests the severity of the situation for freshwater and marine fishes and crustaceans. Of the nation's 343 endangered animal species (as of the end of 1997), 163 (47 percent) were aquatic—9 amphibians, 67 fishes, 16 crustaceans, 15 snails, and 56 clams. (Part III, Table 4.6)

ONLINE RESOURCES

The National Biological Information Infrastructure, a website (http://www.nbii.gov) maintained by the US Geological Survey's Biological Resources Division (http://biology.usgs.gov/), is a rich source

of information on the nation's biological resources. The site provides simplified searching, with a "Search the NBII Web" horizontal button to search all the NBII web pages plus a catalog of biological information from different sources around the nation ("Search the NBII Metadata Clearinghouse"). The site also includes a number of topic areas, including "Hot Topics, Invasive Alien Species, United States, Programs and Organizations, Education, International, and Biodiversity, Systematics, and Collections."

In its Programs and Organizations category, the NBII provides links to numerous federal agencies, including the departments of Defense, Interior, Agriculture, Commerce, Energy, State, EPA, the National Academy of Sciences, National Science Foundation, Smithsonian Institution, and various inter-agency programs such as the Global Change Data and Information System and the Native Plant Conservation Initiative.

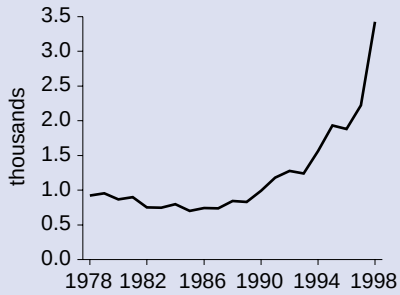
Within Interior's Fish and Wildlife Service, the Office of Migratory Bird Management undertakes a number of surveys in conjunction with Fish and Wildlife Service regional offices, the Canadian Wildlife Service, and state and provincial wildlife management agencies. Links to some of these surveys are available (http://www.fws.gov/r9mbmo/statsurv/mntrtbl.html). For example, the North American Breeding Bird Survey (http://www.mbr.nbs.gov/bbs/bbs.html) provides summary information on population change by region and period, annual indices of abundance for any species in any region, relative abundance maps, and programs to estimate and plot population change for any species on any BBS route or in any region covered by the BBS.

The Department of Agriculture manages a PLANTS National Database that provides a single source of standardized information about plants. This site (http://plants.usda.gov/plants) also provides standardized plant names, symbols, and other plant attribute information.

The NBII site has many nongovernment links, including the Biodiversity Forum at the University of California-Santa Barbara, Bio Web at California State University, the Center for Aquatic Plants at the University of Florida, the Ecological Society of America, the Fish and Wildlife Information Exchange, the U.S. Long-Term Ecological Research Network, and the Natural Heritage Network.

The National Marine Fisheries Service (NMFS), Office of Protected Resources

Figure 4.14 Kemp's Ridley Sea Turtle Nests, 1978-1998



Source: Gladys Porter Zoo, *Report on the Mexico and United States of America Population Restoration Project for the Kemp's Ridley Sea Turtle, Lepidochelyskempii, on the Coasts of Tamaulipas and Veracruz, Mexico* (DOI, FWS, 1997) and R. Marquez (unpubl. data).
Note: Nest counts include those from Rancho Nuevo, Tepehuajes, and Barra del Tordo only.

website (http://www.nmfs.gov/prot_res.html) offers a wealth of information on marine mammals, sea turtles, and threatened and endangered anadromous and marine fish. This website includes information on why various species are listed as threatened and endangered, accounts of their life history, some of the causes of species decline, and links to additional information about species that are under the jurisdiction of NMFS. Other useful information on marine resources can be found at NOAA's *State of the Coast* site (http://state-of-coast.noaa.gov).

Global links include the Convention on Biological Diversity, European Centre for Nature Conservation, Inter-American Biodiversity Information Network, UNESCO's Man and the Biosphere program, the Biodiversity Conservation Information System, the Biodiversity Forum, the International Organization for Plant Information, and the World Conservation Monitoring Centre.

The World Conservation Monitoring Centre (http://www.wcmc.org.uk/) is another site with a vast amount of information on ecosystems and biodiversity. WCMC's latest products include *The World List of Threatened Trees* and the *1997 IUCN Red List of Threatened Plants*.

It also includes a variety of databases and statistics on forests, coasts, species, protected areas, and national biodiversity. The World Conservation Union (IUCN) site (http://www.iucn.org) includes a World Conservation Bookstore, with over 1,300 titles published by IUCN, the Convention on International Trade in Endangered Species, Ramsar Convention on Wetlands, TRAFFIC, and WCMC.

Another valuable website in this area is maintained by The Nature Conservancy (TNC) (http://www.tnc.org). TNC has been active in studying which species, ecological communities, and ecosystems are most threatened. TNC's Conservation Science programs have created a network of databases—the Natural Heritage Program and Conservation Data Center Network—to help identify those species and communities. In the case of plants and animals, TNC's analysis indicates that in the United States alone, close to 4,500 species are faced with possible extinction unless viable habitat is protected and managed.

TNC is using new tools, such as geographic information systems, which can overlay sets of information—on an area's hydrology, vegetation cover, and land-use patterns, for example—to help analyze a particular site. TNC is also trying to assess biodiversity protection at both multiple scales of biology and geography—from rare species to ecosystems, and from nature preserves to landscapes.

TNC's Natural Heritage Program and Conservation Data Center Network comprises 85 biodiversity centers throughout the Western Hemisphere. Since its founding, the Heritage Network has grown to cover all 50 states, five Canadian provinces, and 14 countries in Latin America and the Caribbean. Domestically, these programs are called Natural Heritage Programs; internationally, they are called Conservation Data Centers. Those in the United States are housed various within state government agencies (84 percent), public universities (12 percent), and the Conservancy itself (4 percent).

The Conservancy serves as the principal network organizer, providing technical support and continually updating procedures, methods, and technologies.

The Natural Heritage Network Central Server (http://www.heritage.tnc.org) provides an overview of Natural Heritage Programs, information about the value of biodiversity, plus links to state Natural Heritage programs and other biodiversity-related web sites. The links to Natural Heritage Programs include seven programs in Canada, five in South America, and seven in the Caribbean.

Background on the value of biodiversity can be found in a number of locations on the World Wide Web. Two good explanations can be found at the Environmental Resources Information Network in Australia (http://www.erin.gov.au/life/general_info/op1.html) and the World Resources Institute in Washington (http://www.wri.org/wri/biodiv/cwb-i.html).

The USGS Biological Resources Division has produced several important surveys on the status and trends of the nation's biological resources. *Our Living Resources*, which was published in August 1995, includes more than 200 contributions on monitoring and population trends for many plant, invertebrate, and vertebrate species. The book also includes summaries on the status of several biological communities and ecosystems. It is available in electronic form (http://biology.usgs.gov/s+t/index.htm).

Status and Trends of the Nation's Biological Resources (http://biology.usgs.gov/s+t/SNT/index.htm) includes seven chapters that discuss the factors that affect the nation's ecosystems and biodiversity, including natural processes, harvest exploitation, contaminants, land use, water use, nonindigenous species, and climate change. A second section includes 13 regional chapters on the status and trends of biological resources and ecosystems. A second volume will include a large chapter about the status and trends of the nation's marine resources.

Other groups with an interest in ecosystems and biodiversity include American Rivers (http://www.amrivers.org), International Association of Fish and Wildlife Agencies (http://www.sso.org/iafwa), National Audubon Society (http://www.audubon.org), National Parks and Conservation Association (http://www.npca.org), National Wildlife Federation (http://www.nwf.org), Center for Marine Conservation (http://www.cmc-ocean.org), Defenders of Wildlife (http://www.defenders.org), Ducks Unlimited (http://www.ducks.org), Friends of the Earth (http://www.foe.org), and The Wilderness Society (http://www.wilderness.org).

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CORE DATA